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Perceptions of healthcare robots as a function of emotion-based coping: The importance of coping appraisals and coping strategies

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A B S T R A C T

The urgent pressure on healthcare increases the need for understanding how new technology such as social robots may offer solutions. Many healthcare situations are emotionally charged, which likely affects people's perceptions of such robots in healthcare contexts. Thus far however, little attention has been paid to how people's *prior* emotions may influence their perceptions of the robot. Based on emotional appraisal theories and prior research, we assume that particularly emotional coping appraisals would influence healthcare-robot perceptions. Additionally, we tested effects of actual coping through the use of emotion-focused and problem-focused coping strategies. Hypotheses were tested in a 2 (sad vs. angry) x 2 (hard-to-cope-with vs. easy-to-cope-with) between-subjects experiment, also including a control group. Results ($N = 132$; age range 18–36) showed that manipulated coping potential indirectly affected perceptions of a healthcare robot via the appraisal of coping potential. Furthermore, positive emotion-focused coping affected perceptions of a healthcare robot positively. Thus, people's healthcare-robot perceptions were affected by how they cope or how they think they can cope with their emotions, rather than by the emotions as such.

1. Introduction

The world's population is aging rapidly: Expectations are that the percentage of elderly people (aged 60 and over) worldwide will increase from 12 to 22% by 2050 (World Health Organization, 2015a) and this increase will be even larger in (parts of) North America, Europe, and Asia (i.e., over 30%; World Health Organization, 2015b). These rapidly aging populations worldwide put pressure on both acute and long-term healthcare (World Health Organization, 2015b), and thus the need for solutions to release some of this pressure grows. Solutions are sought, amongst others, in the use of technological assistance such as health informatics services (e.g., Shin, Lee, & Hwang, 2017), wearables/activity trackers (e.g., Shin & Biocca, 2017), robots, or virtual avatars. Increasingly, these technological developments are focused not only on utility, but also on socially interacting with the user (Broadbent, 2017; Salem & Dautenhahn, 2017). Based on the ease with which people communicate in human ways with all kinds of mediated characters and computers (cf. the Media Equation, Reeves & Nass, 1996; anthropomorphism, e.g., Epley, Waytz, & Cacioppo, 2007) and actual observations with a humanlike robot (e.g., Van Kemenade, Konijn, & Hoorn, 2015), the current study focuses on the perceptions people have of social healthcare robots.

Most research on healthcare robots thus far focused on how people perceive or experience such robots *after* they have interacted with them (e.g., Broadbent et al., 2010; Heerink, Kröse, Evers, & Wielinga, 2006). For instance, several studies found that interacting with the cuddly robot seal Paro led to positive emotions in healthy older adults (McGlynn, Kemple, Mitzner, King, & Rogers, 2017), reduced loneliness among residents of a rest home (Robinson, MacDonald, Kerse, & Broadbent, 2013), and led to less agitation and depression among demented elderly nursing home residents (Jøranson, Pedersen, Rokstad, & Ihlebæk, 2015). Little attention has been paid to how people's emotions and attitudes may influence their perceptions of such robots even *prior* to any interaction with it, while expectations not being met (Shin & Choo, 2011) and negative prior attitudes may withhold people from starting (or continuing) interactions with robots in the first place (De Graaf, Ben Allouch, & Van Dijk, 2016; Stafford, MacDonald, Jayawardena, Wegner, & Broadbent, 2014). In a study among

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residents of a retirement village, residents with positive prior attitudes towards robots were more likely to actually use the available robot than residents with less positive prior attitudes towards robots (Stafford et al., 2014). Broadbent et al. (2010) found similar results. They recorded the reactions of participants to a healthcare robot taking their blood pressure and compared this to the reactions to a medical student doing the same. Even though the results of the robot and medical students were in fact equally accurate, participants *believed* that the robot was less accurate and felt less comfortable with it than with the medical students. Furthermore, participants with more positive prior attitudes and emotions about robots in general had more positive perceptions about the medical robot than participants with less favorable prior attitudes and emotions about robots. Because many people in healthcare situations experience intense emotions (e.g., anxiously awaiting a diagnosis, feeling angry or fearful about a bad diagnosis, feeling frustrated by a loss of autonomy over life, etc.), it is thus likely that such emotions affect their perceptions of (future interactions with) healthcare robots. Therefore, studying the effects of people's prior emotions on perceptions of healthcare robots is important in light of the most optimal way for such robots to benefit society.

Emotions may influence our perceptions of healthcare robots via the appraisals of the emotional situation. As suggested by appraisal theorists, every emotional situation is appraised on a number of different dimensions (such as valence, agency, certainty, coping potential, etc.) and each emotion is associated with a distinct pattern of appraisals on these dimensions (e.g., Frijda, 2007; Roseman & Smith, 2001). Emerging from this idea, Lerner and Keltner (2000; 2001) proposed the appraisal-tendency framework, which hypothesizes that the appraisal pattern associated with one's current emotional state could influence one's appraisals of future situations. Thus, the appraisals associated with one's current emotional situation may transfer to future situations. The future situation – which may be unrelated to the initial situation – may then be appraised in a similar way as the current situation. For instance, Lerner and Keltner (2000; 2001) showed that angry people appraise more certainty and control in their situation than fearful people. Consequently, angry people appraise more certainty and control in future (unrelated) situations, eventually leading to more optimistic risk assessments of those future situations.

Previous research found that the effects of people's prior emotions on their perceptions of a healthcare robot were mediated by the appraisal of coping potential (Spekman, Konijn, & Hoorn, 2018). In that study, appraisals of participants' emotional situation were compared for the effects of three different emotional states (sadness, frustration, and happiness) on participants' perceptions of a (future) healthcare robot. Results showed that the three emotional states differed in the appraisals associated to them, some of which in turn affected perceptions of the robot. Thus, the emotional states influenced the perceptions of the robot indirectly. In particular, the appraisal of coping potential appeared to play an important role in mediating between emotional state and perceptions of the robot's affordances, relevance, valence, and use intentions. That is, the easier participants thought they could cope with their emotional situation, the more positive they were about the healthcare robot. Given that many healthcare situations are emotionally taxing and thus require some form of coping, these results guided the current study in examining the effects of coping (potential) on perceptions of healthcare robots.

The appraisal of coping potential is closely related to the coping strategies that people *actually* use to deal with emotionally stressful situations (Bippus & Young, 2012; Lazarus, 1999). However, even though appraised coping potential and actual coping are related, they are not the same: If someone appraises his/her situation as easy-to-cope-with, it does not imply that the person will use effective or 'easy' coping strategies.[1] In the literature, two major types of coping strategies are distinguished as problem-focused coping strategies and emotion-focused coping strategies (Lazarus, 1999; 2001). Problem-focused coping strategies are aimed at changing the problematic or stressful relationship between the self and the situation, for instance, by talking to someone who made you upset to change the situation (Chang, 2013). Emotion-focused coping strategies are aimed at changing the emotion itself, for instance, by consciously changing one's appraisal of the emotional situation (i.e., cognitive reappraisal; Karademas, Tsalikou, & Tallarou, 2001) or sharing one's emotions with someone else (Chang, 2013).

In relating the appraisal of coping potential to the particular coping strategies that an individual actually applies, it is important to note that people may use different coping strategies in parallel (Lazarus, 2006). Thus, emotion-focused and problem-focused coping strategies are not mutually exclusive. While both strategies can be used at the same time, the balance between the two may differ (i.e., a person may use relatively more problem-focused coping strategies in one situation and more emotion-focused coping strategies in others). Which of the two types of coping strategies has the upper hand depends on the appraisal of the emotional situation. For instance, when people feel that they have control over the situation and are able to change the situation the use of problem-focused coping strategies will predominate, whereas feelings of powerlessness and inability to control the situation often coincide with more emotion-focused coping strategies (Chiavarino et al., 2012; Glanz & Schwartz, 2008; Lazarus & Folkman, 1984; Lazarus, 1999). Thus, emotional situations that are appraised as uncontrollable or hard-to-cope-with will lead to relatively more emotion-focused coping, whereas situations that are controllable and easier to cope with will lead to relatively more problem-focused coping.

Following the above reasoning, we hypothesized that people who appraise their emotional situation (i.e., here, in a health context) as hard-to-cope-with will use more emotion-focused coping strategies than problem-focused coping strategies, whereas the opposite is expected for people who appraise the emotional situation as easy-to-cope-with (H1). Furthermore, we expected that emotional situations that are appraised as easy-to-cope-with (i.e., high coping potential) are related to more positive perceptions about healthcare robots (via the use of problem-focused coping, cf. H1) than emotional situations that are hard-to-cope-with (H2).

2. Overview of the current study

To test the hypothesized effects of appraised coping potential and actual use of coping strategies on perceptions of healthcare robots, we manipulated appraisals of coping potential (easy-to-cope-with vs. hard-to-cope-with) in relation to different emotional states (anger vs. sadness). Even though our main aim was to test the effects of appraised coping potential, we recognize that appraisals only occur in the context of emotional states, and that different emotional states are associated to different patterns of appraisals (cf. appraisal theory). Two different emotional states were thus included to check whether the expected effect of the appraisal of coping potential would be unique for any of these emotional states,

[1] Even though some researchers distinguish adaptive and maladaptive coping strategies, others stress that coping strategies are not inherently adaptive or maladaptive. A coping strategy that is adaptive in one situation can be maladaptive in other situations (Carver et al., 1989).

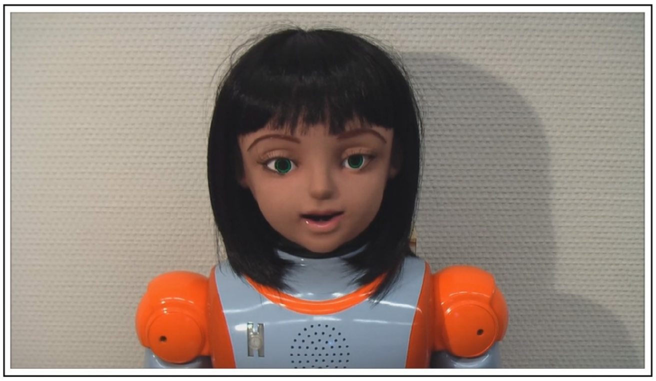

Fig. 1. Screenshot of robot Alice. (Photo: Marloes Spekman).

or whether it existed in spite of the emotional state of the participant. We chose to manipulate anger and sadness because these emotional states often occur in healthcare contexts, based on informal pilot interviews with healthcare professionals, which were in line with the literature (e.g., Olsson et al., 2003). Moreover, the associated appraisal of coping potential clearly differentiates between these two emotions: Anger is generally associated with high coping potential, whereas sadness is associated with low (problem-focused) coping potential (Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003; Lowe et al., 2003). For comparison, we contrasted this with a control group in a relaxed state (which is considered as slightly positive). We induced emotional state by means of a commonly applied recall procedure (cf. Lerner & Keltner, 2001; Small & Lerner, 2008). Appraised coping potential was manipulated by asking participants either to recall a situation they could easily cope with or to recall a situation they could hardly cope with. Because the control group was instructed to recall a situation in a relaxed state, coping potential was not manipulated within this group.

Participants were invited to a study about emotional memories. References to robots were intently avoided to prevent self-selection bias and interference of prior perceptions of robots with the expected effects of emotional state and appraised coping potential. Only after emotion recall were participants informed that they would interact with humanoid social robot Alice[2] about their well-being. Then, the robot asked the participants a series of questions based on the Manchester Short Assessment of Quality of Life (MANSA) questionnaire (Priebe, Huxley, Knight, & Evans, 1999) via brief on-screen video clips (Fig. 1).

3. Methods

3.1. Participants and design

Participants ($N = 141$) were randomly assigned to one of 5 conditions of a 2 (emotional state: sad vs. angry) x 2 (coping potential: hard-to-cope-with vs. easy-to-cope-with) between-subjects experiment and a control group (relaxed emotional state, no coping potential manipulation). Participants were recruited voluntarily and received course credits (through the university's undergraduate participant pool) or a small monetary compensation as a reward. Informed consent was obtained from all participants. Nine participants were removed from the dataset because they displayed clear answering patterns (i.e., only checking the extremes or only the mid-category, no variation), or did not complete the study. The remaining 132 participants ranged in age from 18 to 36 ($M = 21.70$, $SD = 4.68$). The majority was female (77.3%). When checking for gender effects, we found that female participants perceived the humanoid robot as prettier ($M = 2.98$, $SD = 0.80$) than male participants ($M = 2.37$, $SD = 0.99$, F (1,130) = 12.03, $p = .001$, $\eta_p^2 = 0.09$). No other effects of gender were found and therefore gender was not included as covariate in subsequent analyses.

3.2. Procedure

Upon entering the lab, participants were seated behind a PC and instructed to put on headphones and follow on-screen instructions. Participants were informed that the first part of the study was about mapping how people recall and cope with emotional situations. In fact, the participants were instructed to recall an emotional situation (cf. Lerner & Keltner, 2001; Small & Lerner, 2008) related to one of the 5 experimental conditions (i.e., emotional state: sad vs. anger vs. relaxed/control; coping potential: hard-vs. easy-to-cope-with). Participants were instructed to recall the emotional situation as vividly as possible and then to briefly describe the situation and related feelings. To aid recall, we asked several questions (e.g., “What happened that made you feel angry/sad?”; “Why did you feel you could barely cope with/cope quite well with the situation at hand?”). Thereafter, a manipulation check was performed for coping potential (measuring appraisals of coping potential and closely related appraisals such as agency, expectations about the future, and control). Next, we assessed the intensity of the recalled emotion and the coping strategies the participants actually used in dealing with the recalled situation.

In the second part, participants were told to converse with a robot. This was the first time participants were introduced to our humanoid social robot (on screen). We measured participants' initial reactions to introducing the robot, followed by the actual interaction with the robot using a standard protocol for all participants, which ensured controlled length and content of human-robot interaction time. The robot asked the participants a series of questions about health and well-being via brief on-screen video clips (Fig. 1).[3] This interaction was based on the Manchester Short Assessment of Quality of Life (MANSA) questionnaire (Priebe et al., 1999) that is often applied in healthcare settings.

Following the interaction, we measured participants' perceptions of the robot. Next, they were given the opportunity to provide any additional comments on the use of humanoid robots and their feelings about discussing well-being with such a robot. After completing demographic variables and background questions, participants were thanked for their participation and debriefed.

3.3. Measures

3.3.1. Emotion- and problem-focused coping strategies

The 28-item Brief COPE (Carver, 1997) assessed which coping strategies participants used. Originally, the Brief COPE comprised of fourteen 2-item subscales, representing different ways to cope with emotionally stressful situations (Carver, 1997). Although Carver (2007) did not design the scale to distinguish emotion-focused and problem-focused coping strategies, the subscales in the original full-length version of the COPE questionnaire (Carver, Scheier, & Weintraub, 1989) did provide pointers for items to match the concepts of emotion-focused and problem-focused coping.

[2] Alice is humanoid robot (model R-50) with a special expressive face (“Alice”), produced by RoboKind. Since then, RoboKind has stopped producing the Alice-face.

[3] Video clips were used because the (speech) technology was not stable enough to have the humanoid robot interact similarly and consistently in a real-life face-to-face situation with all 141 participants individually.

Combined with results from Exploratory Factor Analyses, a 5-factor solution was deemed most sensible, both in terms of content of the subscales and in reflecting the literature (e.g., Cooper, Katona, Orrell, & Livingston, 2008; Horwitz, Hill, & King, 2011; Knowles, Wilson, Connell, & Kamm, 2011; Wilson, Pritchard, & Revalee, 2005). Therefore, we used these 5 subscales in the current study and they are briefly discussed next (see Table 1 in Appendix for an overview).

Problem-focused coping was measured with 4 items, combining Carver's original subscales of Active Coping and Planning. Together, these items formed a reliable scale (Cronbach's $\alpha = 0.76$). Emotion-focused coping is often seen as a single construct in the extant literature, however, the results of our study showed a clear distinction between positive and negative emotion-focused coping strategies. *Positive emotion-focused coping* consisted of 12 items, containing 6 of Carver's subscales: Positive Reframing, Acceptance, Humor, Denial (recoded), Emotional Support, and Instrumental Support. Together, these 12 items formed a reliable scale (Cronbach's $\alpha = 0.78$). The *negative emotion-focused coping* scale consisted of Carver's 2-item Self-Blame subscale, which had good internal consistency ($R_{\text{Spearman-Brown}} = 0.74$).[4] Finally, 2 separate, more externally driven subscales appeared to be important: coping by substance use and spiritual coping. The 2 items to assess *coping by substance use* together formed a reliable subscale ($R_{\text{Spearman-Brown}} = 0.92$). The 2-item scale for *spiritual coping* (which is somewhat broader than Carver's original Religious Coping subscale) also was reliable ($R_{\text{Spearman-Brown}} = 0.88$).

3.3.2. Appraisal of coping potential

Most scales available in the extant literature to measure appraisals of coping potential were deemed inappropriate for the current study's purposes because they were confounded with either the assessment of actual coping, or the assessment of other appraisals (such as power, agency, or control; cf. Ellsworth & Scherer, 2003). In addition, some existing scales specifically focus on either emotion-focused or problem-focused appraisals of coping potential, but for our study we wanted to assess appraisals of general coping potential. Therefore, based on this literature, we created a new 5-item scale to assess the general appraisal of coping potential (cf. Spekman et al., 2018). Participants indicated the extent to which each of the statements applied to the situation they recalled (e.g., "I trusted that I could cope with the situation") on 5-point rating scales (1 = "totally disagree" to 5 = "totally agree"). After recoding 2 counter-indicative items, the 5 items formed a reliable scale (Cronbach's $\alpha = 0.84$).

3.3.3. Appraisals of agency, future expectancy, and control

The *appraisal of agency* was measured with 4 items covering other-agency (i.e., "something or someone else was responsible for this situation"), self-agency (i.e., "I was responsible for this situation"; both based on Bennett, Lowe, & Honey, 2003), and situational agency (2 items; e.g., "the situation was caused by circumstances beyond human control"; based on Roseman, 1991, as cited in Schorr, 2001). The two items for situational agency formed a fairly reliable scale ($R_{\text{Spearman-Brown}} = 0.67$). The other items were used separately. The scale for the *appraisal of future expectancy* consisted of 2 items (based on Bunk & Magley, 2013; Kuppens, Champagne, & Tuerlinckx, 2012), which formed a fairly reliable scale ($R_{\text{Spearman-Brown}} = 0.68$). Finally, 2 items measured the participant's *appraisal of control* over the situation (Moors, Ellsworth, Scherer, & Frijda, 2013). These 2 items formed a reliable scale ($R_{\text{Spearman-Brown}} = 0.74$). Table 2 in the Appendix presents an overview of all appraisal subscales.

3.3.4. Perceptions of the humanoid robot

Perceptions of the robot were measured using the relevant Likert-type subscales from a well-tested questionnaire to assess relevant perceptions of fictional or virtual characters as applied to humanoid robots (I-PEFiC; e.g., Van Vugt, Konijn, Hoorn, & Veldhuis, 2009; Paauwe, Hoorn, Konijn, & Keyson, 2015). Participants indicated on 5-point rating scales (1 = "does not fit me at all" to 5 = "fits me very well") how much each of the items was in accordance with how they perceived the robot. The subscales we used were: Affordances, ethics, aesthetics, realism, relevance, valence, involvement, distance, and use intentions (Van Vugt et al., 2009) as described below (see Table 3 in Appendix for an overview of the subscales and items used).

Perceived Affordances (i.e., how capable the participant thought the robot was in helping the user achieve his/her goals) were assessed with 4 items (i.e., "I feel the robot is knowledgeable"). Reliability analyses and Principal Components Analysis showed that the two counter-indicative items (dumb, incapable) did not fit the scale, so we created a reliable scale from the remaining 2 items ($R_{\text{Spearman-Brown}} = 0.82$).

Perceived Ethics (i.e., relating to the robot's trustworthiness) was measured with 3 items (e.g., "I feel the robot is sincere"). After removal of 1 item (malevolent), the remaining 2 items formed a reliable scale ($R_{\text{Spearman-Brown}} = 0.69$).

Perceived Aesthetics of the humanoid robot was assessed with 4 items (e.g., "I find the robot handsome"), and together formed a reliable scale (Cronbach's $\alpha = 0.84$).

Perceived Realism was measured with 4 items (e.g., "I feel the robot is real"), which together formed a reliable scale (Cronbach's $\alpha = 0.76$).

The level of personal *Relevance* of the robot to the user was assessed with 4 items (e.g., "I feel the robot is useful"; "I feel the robot is important"). These 4 items displayed high internal consistency (Cronbach's $\alpha = 0.80$).

Perceived Valence (i.e., the direction of how the robot made people feel about her) was assessed with 4 items (e.g., "I have positive expectations about the robot"). These items together formed a reliable scale (Cronbach's $\alpha = 0.85$).

Perceived Involvement and *Perceived Distance* towards the humanoid robot were measured as separate dimensions, as previous research consistently showed that these are separate dimensions that occur in parallel (e.g., Van Vugt, Konijn, Hoorn, Keur, & Eliëns, 2007; Van Vugt, Hoorn, Konijn, & De Bie Dimitriadou, 2006). That is, one can feel emotionally involved with a media figure while at the same time feeling at a distance (Konijn & Bushman, 2007; Konijn & Hoorn, 2005). To measure involvement, 4 Likert-type items were used (e.g., "I feel connected to the robot"; Cronbach's $\alpha = 0.85$). Distance was also assessed using 4 items (e.g., "I felt resistance to talk to the robot"; Cronbach's $\alpha = 0.75$).

Finally, we assessed *Perceived Use Intentions* (i.e., whether participants would use a humanoid robot such as the one featured in the clip for future tasks). The 4 Likert-type items used to measure use intentions formed a reliable scale (e.g., "Next time, I'd rather answer these questions without using the robot" (reverse coded); Cronbach's $\alpha = 0.86$).

3.3.5. Recall intensity

To assess the extent to which people experienced the recalled emotion again, as a manipulation check, we asked participants to indicate the intensity of the recalled emotion on a scale of 0–100.

[4] Eisinga, Te Grotenhuis, and Pelzer (2012) suggest that the Spearman-Brown coefficient is the most appropriate measure of reliability for 2-item scales (compared to Cronbach's alpha and Pearson's correlation).

3.3.6. Prior attitudes and feelings about the robot

Right after being told that they would be conversing with a robot (see *Procedure*) and just prior to the actual conversation, we asked participants how they felt about the idea that they were going to talk to a robot (e.g., “I have positive expectations about the robot”). The 4 items formed a reliable scale (after recoding two counter-indicative items; Cronbach's $\alpha = 0.86$). Another 2 items were used to assess prior attitudes toward the robot (e.g., “I think it is fun that a robot will ask me questions”), which together formed a reliable scale ($R_{\text{Spearman-Brown}} = 0.73$). See Table 4 in the Appendix for an overview of these subscales and items used.

4. Results

4.1. Manipulation Checks

First, we checked the intensity of emotion recall among participants. A one-sample *t*-test was performed for the entire sample to test whether participants' mean intensity of the assigned emotion was significantly different from 0 (i.e., not experiencing any emotion). Results showed that intensity scores were significantly different from 0, $t\ (131) = 19.96$, $p < .001$, $M = 45.23$, $SD = 26.04$. When we repeated this analysis for each of the 3 emotional conditions (sad vs. angry vs. relaxation) separately, we found that this significant difference from 0 was replicated for each condition (sad: $t\ (53) = 10.57$, $p < .001$, $M = 37.39$, $SD = 26.00$; angry: $t\ (52) = 13.08$, $p < .001$, $M = 42.15$, $SD = 0.23.47$; relaxation: $t\ (24) = 20.50$, $p < .001$, $M = 68.72$, $SD = 16.76$).

Next, to test for differences between the emotion and control conditions in intensity of emotion recall, we performed a 3 (emotional state: sad vs. angry vs. relaxation) x 3 (manipulated coping potential: easy vs. hard vs. control) between-subjects ANOVA. We found no significant differences between the emotional state conditions, $F\ (1{,}127) = 1.16$, $p = .28$, nor the interaction of emotional state and coping potential, $F\ (1{,}127) = 0.10$, $p = .75$. However, we did find a marginally significant difference between the coping potential conditions, $F\ (1{,}127) = 3.56$, $p = .06$. Pairwise comparisons[5] showed that the intensity of emotion recall was significantly higher in the control group ($M = 68.72$, $SD = 16.76$) than in the experimental groups ($M_{\text{easy}} = 44.02$, $SD_{\text{easy}} = 23.76$; $M_{\text{hard}} = 35.56$, $SD_{\text{hard}} = 25.26$; both p's < 0.001). Because participants in the control group experienced a relatively high level of emotion recall in contrast to what we had intended (i.e., we expected a less intense emotion by asking them to recall a situation that was emotionally not very taxing), the control group was excluded from further analyses (remaining $N = 107$). Pairwise comparisons further showed no significant differences between the *experimental* conditions in terms of intensity (all *ns*), indicating that manipulations of emotional recall were similarly effective for both anger and sadness, as well as for easy-to-cope-with and hard-to-cope-with situations. Hence, the emotion and coping appraisal manipulations were successful.

Additionally, a large variation in intensity of emotion recall was found within the experimental conditions (range 0–100). The distribution of scores (see Fig. 2) appeared to have two peaks: a low-emotional group (scores 0–50 on recall intensity) and a high-emotional group (scores 51–100). We reasoned that participants do have to experience emotions to some extent to be able to show emotion effects. Intensity and strength of emotion induction procedures are a known problem in the field of emotion research (cf. Angie, Connelly, Waples, & Kligyte, 2011; Lench, Flores, & Bench, 2011). Therefore, we analyzed both the full sample as well as the high-emotional group (scores > 51). As more than half of the sample existed of participants that experienced little to no emotion, no effects were observed in the full sample. Yet, because many healthcare situations are in fact highly taxing emotional situations, analyses for potential effects of those emotions only make sense among groups of participants who actually *do* experience emotions. Therefore, we decided to split the participants into two groups based on the two peaks and report results only about the group that experienced emotions relatively more intensely (i.e., scores > 50).

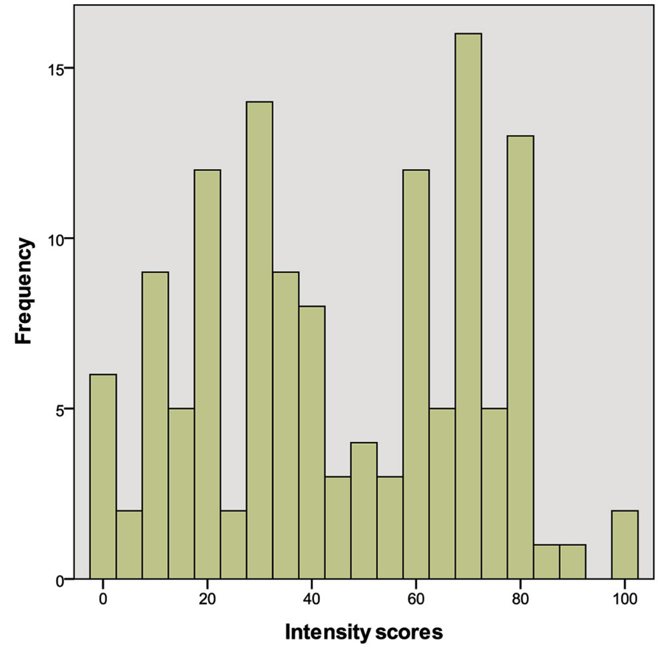

Fig. 2. Histogram of emotion recall intensity scores over all conditions ($N = 132$) *Note.* Bars represent the frequency of emotion recall intensity scores (scale 0–100).

As a second manipulation check, we tested whether the appraisals differed between the emotional state and coping potential conditions in performing a 2 (emotional state) x 2 (manipulated coping potential) MANOVA with the appraisals as dependent variables. Based on the literature, we expected anger and sadness to differ in terms of appraised coping potential, agency, and future expectancy (Bennett et al., 2003; Harmon-Jones et al., 2003; Lowe et al., 2003). The hard- and easy-to-cope-with conditions were expected to differ on appraised coping potential, and possibly on the closely related appraisals of control, agency, and future expectancy. Results showed significant multivariate main effects of emotional state (Wilk's $\lambda = 0.62$, $F\ (7{,}31) = 2.72$, $p = .03$, $\eta_p^2 = 0.38$) and coping potential (Wilk's $\lambda = 0.52$, $F\ (7{,}31) = 4.05$, $p = .003$, $\eta_p^2 = 0.48$), as well as a significant interaction effect (Wilk's $\lambda = 0.61$, $F\ (7{,}31) = 2.85$, $p = .02$, $\eta_p^2 = 0.39$). We will discuss these interaction effects in light of the univariate results below.

The multivariate interaction effect for emotional state and manipulated coping potential was characterized by a significant univariate effect only on the appraisal of control, $F\ (1{,}37) = 8.33$, $p = .006$, $\eta_p^2 = 0.18$. As it turned out, angry participants in the easy-to-cope-with condition experienced more control than did angry participants in the hard-to-cope-with condition. For sad participants, we also found that participants in the easy-to-cope condition experienced more control than participants in the hard-to-cope-with condition, yet the difference between the two coping potential conditions was much larger than it was among the angry participants (see Table 5 in the Appendix).

The univariate main effects further supported the interaction

[5] All reported pairwise comparisons in the results section include Bonferroni correction.

effect, where emotional state differed significantly on the appraisals of coping potential (F (1,37) = 4.27, p = .05, $\eta_p^2 = 0.10$) and situational agency (F (1,37) = 14.49, p = .001, $\eta_p^2 = 0.28$). Specifically, and in line with expectations, angry participants found it easier to cope with the situation and attached more human agency (i.e., less situational agency) to the situation than sad participants (see Table 6 in the Appendix). Contrary to our expectations, we found no difference between sad and angry participants in terms of appraised future expectancy (both single items *ns*).

Finally, the interaction effect was also supported by univariate main effects for differences between manipulated coping potential conditions on appraised coping potential (F (1,37) = 11.97, p = .001, $\eta_p^2 = 0.24$), control (F (1,37) = 14.33, p = .001, $\eta_p^2 = 0.28$), and self-agency (F (1,37) = 4.63, p = .04, $\eta_p^2 = 0.11$). Participants in the easy-to-cope-with condition were found to appraise their emotional situation as significantly easier to cope with, felt more in control of the situation, and more often believed they themselves were responsible for the situation compared to participants in the hard-to-cope-with condition (see Table 7 in the Appendix). Thus, the manipulation of coping potential was deemed successful.

4.2. Hypothesis testing: effects of emotional state and manipulated coping potential on coping strategies

In H1, we predicted that emotional state and manipulated coping potential would affect the coping strategies that participants used. Because previous authors indicated that the use of coping strategies is not a matter of either/or (Lazarus, 2006), we tested the relative use of coping strategies in a Mixed ANOVA with emotional state and manipulated coping potential as between subject-factors, and the 3 coping strategies of interest (i.e., positive emotion-focused, negative emotion-focused, and problem-focused[6]) as within-subjects dependent measures.

Results showed significant multivariate and univariate within-subject effects for coping strategy, F (1.732,64.079) = 11.55, $p < .001$, $\eta_p^2 = 0.24$.[7] Pairwise comparisons showed that the negative emotion-focused strategy was used significantly less than the positive emotion-focused (p = .002) and problem-focused coping strategies (p = .001). The positive emotion-focused and problem-focused coping strategies did not significantly differ from one another in terms of how often they were used (*ns*).

Multivariate and univariate tests showed that there was no mixed interaction effect of manipulated coping potential and coping strategies used ($ps > .9$), and no 3-way interaction effect of emotional state, manipulated coping potential, and coping strategies used ($ps > .1$). Furthermore, between-subjects tests of emotional state, coping potential, and the interaction thereof showed no significant effects (all *ns*). Thus, these results did not support our hypothesis that the (relative) choice of coping strategies used differed between hard-to-cope-with and easy-to-cope-with emotional situations. Nevertheless, our interest in how these would affect robot perceptions could still be tested, in the following.

4.3. Effects on perceptions of the healthcare robot

The next hypothesis (H2) predicted that easy-to-cope-with situations and the use of problem-focused coping strategies would lead to more positive perceptions of the robot than harder-to-cope-with situations and the use of emotion-focused coping strategies. To test this, we conducted several tests. First, we performed a MANOVA to test for direct effects of the experimental conditions (emotional state and manipulated coping potential) on the perceptions of the robot. This was followed by two series of regression analyses with the perception measures as dependent variables: The first with the appraisals[8] as predictors, and the second with the 3 coping strategies as predictors. All regressions were hierarchical; we controlled for prior feelings and attitude toward the robot (i.e., before they encountered the robot) in block 1 and added the appraisals in block 2. Results of these tests are reported below.

To test for direct effects of conditions on perceptions of the robot, we entered the variables into a 2 (emotional state: sad vs. angry) x 2 (coping potential: hard-to-cope-with vs. easy-to-cope-with) MANOVA. Multivariate effects for emotional state, manipulated coping potential as well as the interaction between the two factors turned out to be not significant (all Wilk's λs < 1, $Fs < 1$, $ps >$ .5). Thus, we found no differences between the angry and sad participants, nor between the participants in the easy-to-cope-with and hard-to-cope-with conditions, in how participants perceived the robot.

For the regression analyses with appraisals as predictors (in block 2), we found that the control variable *prior feelings towards the robot* affected some of the perceptions of the robot.[9] More interestingly, we found that the appraisal of coping potential also affected the perception measures. Appraised coping potential was found to positively affect the perceived relevance of the robot (b (SE_b) = 0.41 (0.16), $\beta = 0.43$, p = .02), and marginally significant positive effects were found for perceived affordances (b (SE_b) = 0.35 (0.20), $\beta = 0.33$, p = .08), perceived realism (b (SE_b) = 0.30 (0.16), $\beta = 0.31$, p = .07), and use intentions (b (SE_b) = 0.35 (0.20), $\beta = 0.32$, p = .09). Thus, participants who found it easier to cope with their emotional situation were more likely to perceive positive affordances in the robot, perceived it as more realistic, found it more personally relevant, and showed higher intentions to use the robot in the future.

For the regression analyses with the 3 coping strategies (problem-focused, negative emotion-focused, and positive emotion-focused coping) as predictors (in block 2), we again found that *prior* feelings significantly affected perceptions of the robot[10]. Furthermore, we also found effects of prior attitude on perceptions of the robot's realism and personal relevance.[11] Beyond these effects, we also found that using the *positive emotion-focused coping strategy* had significant positive effects on perceived affordances (b (SE_b) = 0.63 (0.24), $\beta = 0.47$, p = .01), perceived ethics (b (SE_b) = 0.63 (0.27), $\beta = 0.41$, p = .02) and perceived relevance of the robot (b (SE_b) = 0.64 (0.19), $\beta = 0.53$, p = .002). Additionally, we found that

[6] For reasons of clarity, we have left out the substance (ab)use and spiritual coping strategies (see ‘measures’) in these analyses. Upon request, a full analysis including all 5 coping strategies can be provided, yet these did not alter the main results.

[7] Because the assumption of sphericity was violated, the Greenhouse-Geisser correction was applied. This made no difference as to the outcome of the test.

[8] We entered only those appraisals for which we found significant differences between the experimental conditions in previous analyses (see *Manipulation Checks*).

[9] Prior feelings towards the robot positively affected valence toward the robot after actually interacting with it ($b(SE_b)$ = 0.77(0.23), $\beta = 0.65$, p = .002) and involvement with the robot ($b(SE_b)$ = 0.56(0.20), $\beta = 0.55$, p = .009). Marginally significant effects were found for perceived aesthetics ($b(SE_b)$ = 0.45(0.23), $\beta = 0.40$, p = .06), distance ($b(SE_b)$ = −0.40(0.23), $\beta = -0.37$, p = .09), and intentions to use the robot ($b(SE_b)$ = 0.43(0.24), $\beta = 0.37$, p = .08).

[10] Prior feelings were found to positively influence the direction of valence for the robot ($b(SE_b)$ = 0.69(0.23), $\beta = 0.58$, p = .005), involvement with the robot ($b(SE_b)$ = 0.49(0.20), $\beta = 0.47$, p = .02), and perceived aesthetics ($b(SE_b)$ = 0.48(0.19), $\beta = 0.43$, p = .02). In addition, a marginally significant positive effect on use intentions was found ($b(SE_b)$ = 0.41(0.24), $\beta = 0.35$, p = .096).

[11] The more positive the prior attitude about robots was, the more realistic ($b(SE_b)$ = 0.37(0.18), $\beta = 0.40$, p = .048) and personally relevant ($b(SE_b)$ = 0.49(0.18), $\beta = 0.52$, p = .01) participants perceived the robot to be.

using this strategy had several marginally significant effects: on perceptions of the robot's aesthetics (b (SE_b) = 0.35 (0.20), $\beta = 0.26$, $p = .096$), realism (b (SE_b) = 0.37 (0.20), $\beta = 0.31$, $p = .07$), involvement (b (SE_b) = 0.38 (0.21), $\beta = 0.31$, $p = .08$), distance (b (SE_b) = −0.44 (0.22), $\beta = -0.34$, $p = .06$), and use intentions (b (SE_b) = 0.48 (0.25), $\beta = 0.34$, $p = .07$).

The results suggest that the more participants used the positive emotion-focused coping strategy, the more positive they were about the robot's affordances, ethics, and aesthetics, the more realistic and relevant they perceived the robot to be, the more involved and less distant they felt towards the robot, and the higher their intention was to use the robot in the future.

Furthermore, we found a significant positive effect for the *negative emotion-focused coping strategy* on perceived aesthetics (b (SE_b) = 0.37 (0.10), $\beta = 0.51$, $p = .001$) and a marginally significant positive effect on perceived realism (b (SE_b) = 0.19 (0.10), $\beta = 0.29$, $p = .06$). Finally, a marginally significant positive effect of *problem-focused coping* on perceived distance towards the robot was found (b (SE_b) = 0.34 (0.17), $\beta = 0.38$, $p = .05$). The problem-focused coping strategies did not affect any of the other perception measures.

5. Discussion

Technological opportunities provided by, for example, social robots appear essential to deal with the increasing pressure on healthcare (Broadbent, 2017). Because people often experience intense emotions in healthcare contexts, the current research focused on the influence of emotions, emotional coping, and appraised coping potential on people's perceptions of healthcare robots. Main results showed that the appraisal of coping potential had a positive effect on participants' perceptions of the robot, while the manipulated emotional state and coping potential only indirectly affected these perceptions. Moreover, we found that the coping strategies that participants used had some effects on their perceptions of the humanoid robot, the most important finding being that the use of the positive emotion-focused coping strategy had a positive effect on perceptions of the robot's affordances, ethics, aesthetics, realism, relevance, involvement, and use intentions.

Thus, results showed that the positive emotion-focused coping strategy and the appraisal of coping potential both positively influenced perceptions of the humanoid robot. However, because the use of the positive emotion-focused coping strategy did not differ between the conditions, H2 had to be rejected for *actual* coping. For the appraisal of coping potential, on the other hand, H2 was partially confirmed. Even though we did not find a direct effect of manipulated coping potential on perceptions of the healthcare robot, we did find a positive effect of *appraised* coping potential on perceptions of the robot. In line with previous results (Spekman et al., 2018), we found that if participants appraised their emotional situation as easier to cope with, they were more likely to have positive perceptions of the robot's affordances, realism, and relevance, and higher intentions to use the robot in the future. In addition, the appraisal of coping potential differed between the manipulated coping conditions. These results suggest an indirect effect of manipulated coping potential on perceptions of a healthcare robot via appraisals of coping potential.

Although manipulated coping potential was also related to appraisals of control and self-agency (cf. predictions from the literature; e.g., Lazarus, 1999), results showed that *only* the appraisal of coping potential positively affected perceptions of the healthcare robot. Thus, the appraisal of coping potential is clearly distinct from appraisals of control and self-agency. We can only speculate as to why this appraisal of coping potential influences people's perceptions whereas appraisals of control and self-agency do not. One possible explanation may be that situations that are hard to cope with require people's full cognitive capacity to deal with the situation, whereas easy-to-cope with situations leave people with enough cognitive capacity to be open to new experiences, such as conversing with robots.

In contrast to our expectations that easy-to-cope-with emotional situations would lead to more problem-focused coping while hard-to-cope-with emotional situations would lead to more emotion-focused coping, the results showed no support for H1. Manipulated coping potential did not have a direct effect on the choice of coping strategy (i.e., it was not related to the use of problem-focused or emotion-focused coping). A possible explanation for this may be that problem-focused coping strategies are most effective for emotional situations that are changeable and emotion-focused coping strategies are most effective for emotional situations that are not changeable (cf. Glanz & Schwartz, 2008). In the current study, we asked people to report all coping strategies that they had used when the emotional situation occurred, and we did *not* ask them to assess the effectiveness of each of these strategies in their recalled situations. Thus, participants may have tried out (and reported) different coping strategies at different points in time after the emotional situation occurred, some of which may have turned out less adaptive for their specific situation than others.

Importantly, the results with regard to coping strategies showed that our classification of coping strategies (into emotion-focused and problem-focused) was very similar to the classifications by other authors (e.g., Cooper et al., 2008; Horwitz et al., 2011; Knowles et al., 2011; Wilson et al., 2005). Important differences were found, however, in the existence of two separate emotion-focused coping dimensions: positive and negative emotion-focused coping. The positive dimension covered subscales such as acceptance, instrumental and emotional support, and positive reframing subscales (cf. Carver, 1997). The negative emotion-focused coping dimension covered the self-blame/self-critique subscale, which was either included in a general emotion-focused scale or categorized as a dysfunctional coping strategy in earlier studies (Cooper et al., 2008). Our results showed that the positive emotion-focused coping strategy sorted effects on perceptions of a healthcare robot, whereas the negative emotion-focused coping strategy did not. Thus, the current study showed that it is important to distinguish a positively and negatively toned dimension of emotion-focused coping.

A limitation of the approach we used in the current study, which is a general difficulty in emotion-based research, is that the intensity of emotion recall overall was not very high among participants. Therefore, we selected those participants who did report a minimum level of emotion intensity. After all, to be able to test coping strategies in view of emotionally taxing states one *does* need to experience such a state. This also has a drawback however, as the resulting number of participants for testing the hypotheses was relatively low. Post hoc power analysis using FPOWER (Friendly, n.d.) were performed to see whether our design had enough power to detect effects of manipulated coping potential. To detect a medium effect of 0.50, a power of .80 required an N of approximately 64. Thus, we did seem to have sufficient power to detect effects of manipulated coping potential. Furthermore, significant effects of the appraisal of coping potential were found on multiple dimensions of how the healthcare robot was perceived. In general, these findings replicated results from an earlier study (Spekman et al., 2018) which adds to their validity. In addition, the positive emotion-focused coping strategy also clearly sorted effects on how the robot was perceived. Therefore, we tend to conclude that despite the relatively small sample size in the analyses, we seemed to have enough power to detect effects and interesting findings showed up that are worth further investigation.

Related, the recall procedure that we used appeared effective in prior research (e.g., Small & Lerner, 2008), but the intensities of recalled emotional states on average were relatively low in the current study. This is in line, however, with findings from meta-analyses on the influence of discrete emotions on cognition, judgment, and decision-making, which showed that such recall procedures generally produce smaller effect sizes than procedures that use film clips to induce emotion (Angie et al., 2011; Lench et al., 2011). However, such visual materials also include cognitive content that may further influence dependent variables (Lench et al., 2011). In all, intensity of emotions through emotion-elicitation procedures and the effectiveness of such procedures may be confounded, so future studies are needed to further investigate various methods of emotion induction. More challenging but probably effective procedures might be tested in field situations where emotional encounters more naturally occur.

The current study used anger and sadness as target emotions because healthcare professionals identified them as often occurring in healthcare situations and they varied on the appraisal of coping potential, which was consistent with the literature (Harmon-Jones et al., 2003; Lowe et al., 2003). However, other emotions might also be considered relevant to examine in future research. The literature on stress – as healthcare situations are often stressful – identifies threat and challenge as important appraisals (e.g., Lazarus, 2006). Challenge and threat are found to differently impact the way in which people cope with their emotions (Lazarus, 2006). Future studies may therefore include these appraisals as well, and include the relationship between the appraisals of threat/challenge and the appraisal of coping potential.

In all, the findings of the current study showed that perceptions of a healthcare robot are positively affected by the appraisal of coping potential and the use of positive emotion-focused coping strategies when facing emotionally taxing healthcare situations. Thus, individuals' feelings *prior* to their encounter with a healthcare robot only indirectly influenced their perceptions of a healthcare robot. That is, through the individual's appraisal of the potential to cope with the emotional situation and through applying a positive emotion-focused coping strategy to deal with that situation. These results are important in our understanding of future human-robot interactions and to inform about appropriate contexts in which to deploy such healthcare robots (or in which kinds of contexts it is better *not* to deploy them and/or to first refocus one's appraisals). Our results showed that the emotion-based context is very important: People who appraise their situation as hard-to-cope-with may not benefit from a robot, whereas people who feel they are able to cope with their situation may be much more open to being helped by a robot. Thus, not the emotional state *per se* influences how people perceive support by a robot, but rather how well they (think they can) cope with that emotion affects how they perceive a healthcare robot's support.

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Appendix 1. Tables

Table 1
Overview of the coping strategy measures and their reliabilities [a]

Subscale	Items included in scale	Reliability[b]
Positive emotion-focused coping	*I've been* … trying to see it in a different light to make it seem more positive; looking for something good in what is happening; accepting the reality of the fact that it has happened; learning to live with it; making jokes about it; making fun of the situation; getting emotional support from others; getting comfort and understanding from someone; trying to get advice or help from other people about what to do; getting help and advice from other people; saying to myself "this isn't real"; refusing to believe that it has happened	.78
Negative emotion-focused coping	*I've been* … criticizing myself; blaming myself for things that happened	.74
Problem-focused coping	*I've been* …. concentrating my efforts on doing something about the situation I'm in; taking action to try to make the situation better; trying to come up with a strategy about what to do; thinking hard about what steps to take	.76
Coping by substance use	*I've been* … using alcohol or other drugs to make myself feel better; using alcohol or other drugs to help me get through it	.92
Spiritual coping	*I've been* … looking for comfort in my religious or spiritual beliefs; praying or meditating	.88

[a] 6 items of the original Brief COPE did not fit any of the subscales based on reliability analyses and PCAs.
[b] Reported values are Spearman-Brown's coefficient for two-item subscales and Cronbach's alpha for others.

Table 2
Overview of the appraisal measures and their reliabilities

Subscale	Items included in scale	Reliability[a]
Coping potential	I knew what my best option was in this situation; I thought it would be difficult to deal with this situation[c]; I felt that I could easily cope with this situation; It was unclear how to deal with this situation[c]; I trusted that I could cope with the situation	.84
Other-agency [b]	Something or someone else was responsible for this situation	
Self-agency [b]	I myself was responsible for this situation	
Situational agency	The situation was caused by circumstances beyond human control; The situation was at it was due to circumstances beyond anyone's control	.67
Future expectancy	I thought the situation would get worse[c]; I thought the situation would end well	.68
Control	I felt that I could influence the situation; I was convinced that I could change the situation	.74

[a] Reported values are Spearman-Brown's coefficient for two-item subscales and Cronbach's alpha for others.
[b] Single item, so no reliability was calculated.
[c] Item was reverse-coded.

Table 3
Overview of the robot perception measures and their reliabilities

Scale	Items included in scale	Reliability[a]
Perceived valence	*I …* have positive expectations; expect it to be annoying to talk to the robot[b]; am looking forward to answering the robot's question; have negative expectations of the robot[b]	.85
Perceived affordances	*I feel the robot is …* knowledgeable; dumb[b,c]; capable; incapable[b,c]	.82
Perceived aesthetics	*I find the robot …* pretty; unattractive[b]; ugly[b]; handsome	.84
Perceived realism	*I feel the robot is …* natural; fake[b]; real; human	.76
Perceived relevance	*I feel the robot is …* important; useful; useless[b]; pointless[b]	.80
Perceived ethics	*I feel the robot is …* reliable; sincere; malevolent[b,c]	.69
Perceived involvement	*I feel …* connected to the robot; good about the robot; involved with the robot; it's nice to be in contact with the robot	.85
Perceived distance	*I feel …* its annoying to deal with the robot; negative about the robot; a distance between the robot and me; resistance to talk to the robot;	.75
Perceived use intentions	I would like to have this kind of interview with the robot more often; I would want to do more with the robot; I think the robot is inappropriate for an interview like this[b]; Next time, I'd rather answer these questions without using the robot[b]	.86

[a] Reported values are Cronbach's alpha for all scales except perceived affordances and perceived ethics (which used Spearman-Brown's coefficient).
[b] Item was reverse-coded.
[c] Item dropped from the scale based on results of PCA and reliability analysis.

Table 4
Overview of the prior attitude and feelings measures and their reliabilities

Subscale	Items included in scale	Reliability[a]
Prior attitude about robots	*I think it's …* fun that the robot will ask me questions; interesting that a robot is going to interview me	.73
Prior feelings about robots	*I …* have positive expectations about the robot; expect it to be annoying to talk to the robot[b]; am looking forward to answering the robot's questions; have negative expectations about the robot[b]	.86

[a] Reported values are Spearman-Brown's coefficient prior attitude and Cronbach's alpha for prior feelings.
[b] Item was reverse-coded.

Table 5
Means (*M*) and standard deviations (*SD*) for the interaction effect of emotional state and manipulated coping potential on appraisals of the emotional situation.

	Sad				Angry			
	Easy-to-cope		Hard-to-cope		Easy-to-cope		Hard-to-cope	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Coping potential	2.56	.79	1.95	.59	3.14	.70	2.26	.58
Situational agency	3.55	.98	3.19	1.71	1.96	.66	2.25	.82
Control	3.55*	.90	1.44*	.68	2.88*	.94	2.60*	1.33
Other-agency	3.50	1.35	3.25	1.91	3.69	1.32	4.30	1.06
Self-agency	3.00	1.56	1.63	1.06	2.46	1.20	2.10	1.20
Expected negative outcome	3.00	1.63	3.75	1.04	3.38	.87	3.00	1.16
Expected positive outcome	3.10	1.29	2.00	.93	2.23	1.36	2.70	1.42

*Difference is significant at $p < .01$.

Table 6
Means (*M*) and standard deviations (*SD*) for sad vs. angry participants on appraisals of the emotional situation.

	Sad		Angry	
	M	*SD*	*M*	*SD*
Coping potential	2.29*	.76	2.76*	.78
Situational agency	3.39**	1.32	2.09**	.73
Control	2.61	1.33	2.76	1.11
Other-agency	3.39	1.58	3.96	1.22
Self-agency	2.39	1.50	2.30	1.19
Expected negative outcome	3.33	1.41	3.22	1.00
Expected positive outcome	2.61	1.24	2.43	1.38

*Difference is significant at $p < .05$.
**Difference is significant at $p < .01$.

Table 7
Means (*M*) and standard deviations (*SD*) for participants in the easy-to-cope-with vs. hard-to-cope-with conditions on appraisals of the emotional situation.

	Easy-to-cope-with		Hard-to-cope-with	
	M	*SD*	*M*	*SD*
Coping potential	2.89**	.78	2.12**	.59
Situational agency	2.65	1.13	2.67	1.34
Control	3.17**	.96	2.08**	1.22
Other-agency	3.61	1.31	3.83	1.54
Self-agency	2.70*	1.36	1.89*	1.13
Expected negative outcome	3.22	1.24	3.33	1.14
Expected positive outcome	2.61	1.37	2.39	1.24

*Difference is significant at $p < .05$.
**Difference is significant at $p < .01$.

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